Comparison of A*, LPA*, D* Lite

1. *Mazes.*

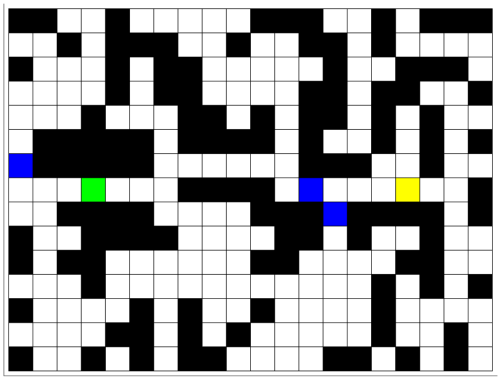


Figure 1: Sample 8-connected maze [p = q = r = 1]

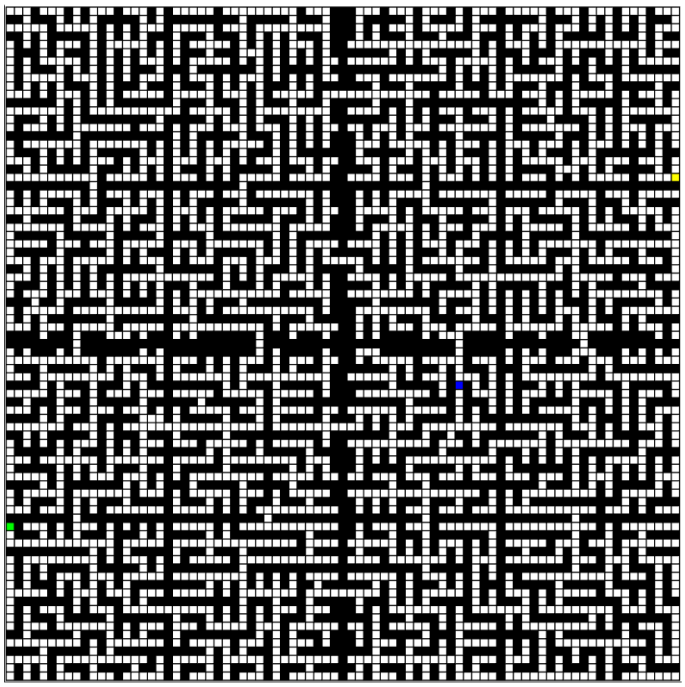


Figure 2: Sample 4-connected maze [p = 4, q = 2]

2. *Performance of D* Lite and "dynamic" A*.*

Table 1: Results for solving the 8-connected maze 1

Algorithm	**Heuristic**	**Path 1**	**Path 2**	**Path 3**	**Total Extractions**
A*	None	110	136	79	325
	Diagonal distance	19	81	43	143
D* Lite	None	136	63	43	242
	Diagonal distance	21	104	20	145

Table 2: Results for solving the 4-connected maze 2

Algorithm	**Heuristic**	**Path 1**	**Path 2**	**Total Extractions**
A*	None	3187	3186	6373
	Manhattan distance	2783	1996	4779
	way-point Manhattan	2243	1512	3755
	way-point actual distance	1272	908	2180
D* Lite	None	3061	637	3698
	Manhattan distance	1926	546	2472
	way-point Manhattan	1786	519	2305
	way-point actual distance	563	886	1449

Computing actual distance between way-points took 11029 set extractions with Dijkstra's algorithm

3. *Performance of LPA*.*

Table 3: Results for solving the 4-connected maze 2

Algorithm	**Heuristic**	**Path 1**	**Path 2**
A*	None	3187	3186
	Manhattan distance	2783	2848
	way-point Manhattan	2243	2313
	way-point actual distance	1272	1335
LPA*	None	3186	1435
	Manhattan distance	2805	1336
	way-point Manhattan	2270	975
	way-point actual distance	1304	954

Computing actual distance between way-points took 11029 set extractions with Dijkstra's algorithm

4. *Graphical solution of mazes.*

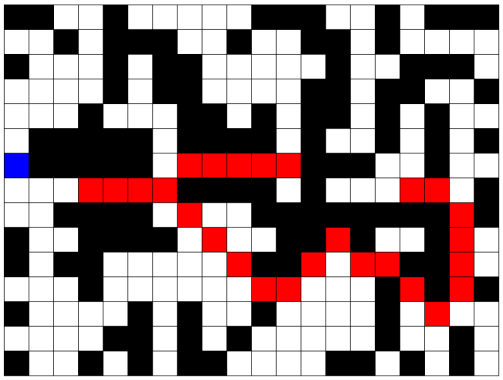


Figure 3: Solution generated by dynamically traversing maze 1

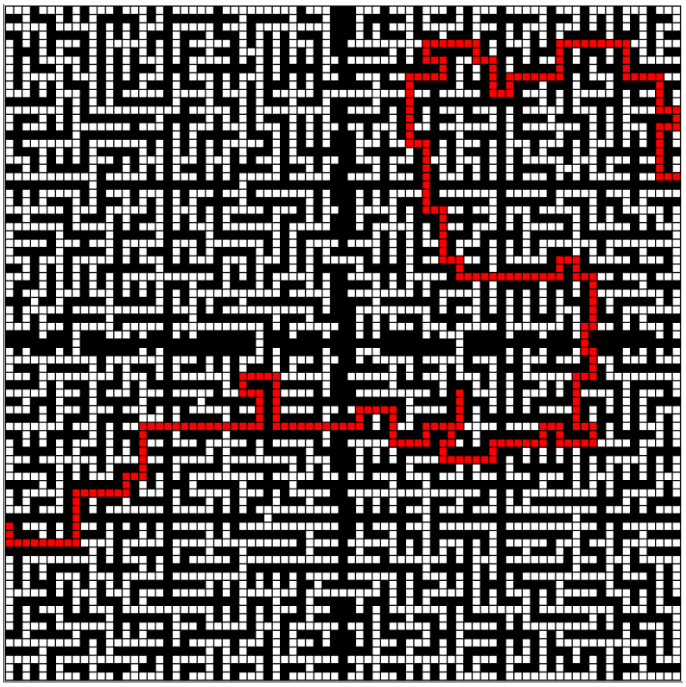


Figure 4: Solution generated by dynamically traversing maze 2

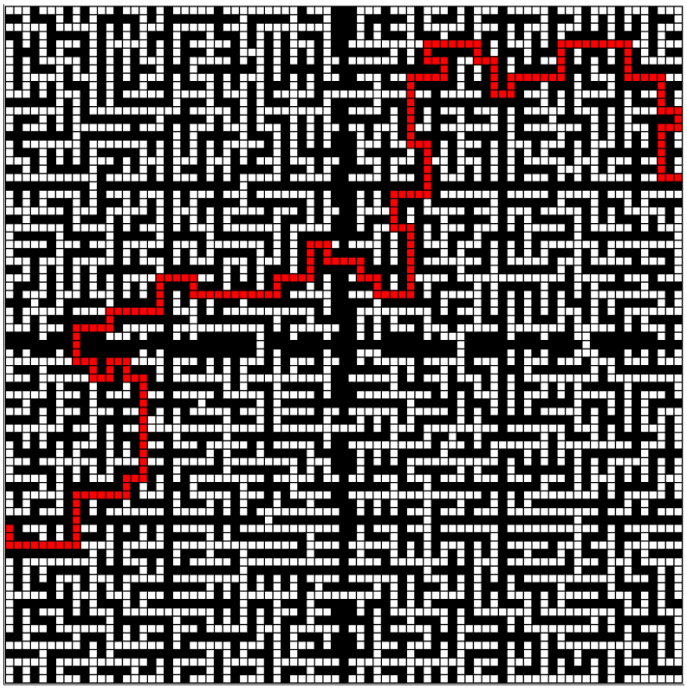


Figure 5: Solution generated by re-solving maze 2

5. *Dynamically solving an unknown maze.*

Table 4: Results for solving the 8-connected maze 1

Algorithm	**Heuristic**	**Total Extractions**	**Path Length**
A* [Empty maze]	None	248	13
	Diagonal distance	14	13
D* Lite	None	734	67
	Diagonal distance	723	67

1. All walls are treated as unknown obstacles

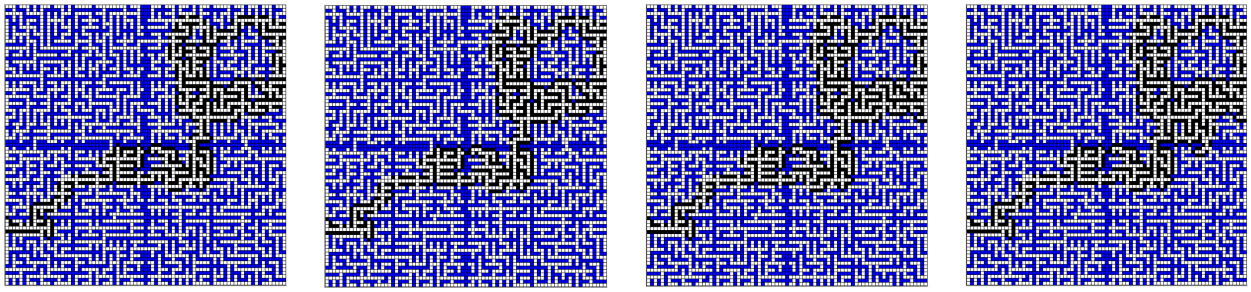
Table 5: Results for solving the 4-connected maze 2

Algorithm	**Heuristic**	**Total Extractions**	**Path Length**
A* [Empty maze]	None	6446	404
	Manhattan distance	123	404
D* Lite	None	12874	2364
	Manhattan distance	12997	2364
	way-point Manhattan	21478	2820
	way-point actual distance	18747	3048

1. All walls are treated as unknown obstacles
2. Computing actual distance between way-points took 11029 queue extractions with Dijkstra's algorithm

None Diagonal

Figure 6: The path explored by the D* algorithm in maze 1 for the different heuristics



None Manhattan way-pt Manh. way-pt actual

Figure 7: From left to right: path explored by the D* algorithm in maze 2 for the different heuristics

6. *Exiting the market with incomplete fulfillment.*

Table 6: Results for optimal stock selling

Method	**Average extractions**	**Average reward**
Random prices	683.38	8.47
Expected value	827.22	9.84
Value iteration	-	11.6

10,000 trials were used for the Monte Carlo simulation

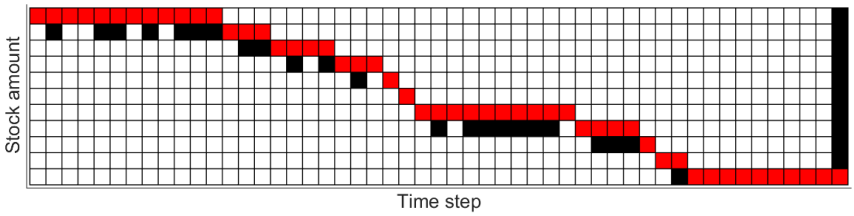


Figure 8: Sample trajectory of the incomplete fulfillment problem